(OLD COURSE)   QP Code : 4005

(3 Hours)   [Total Marks :100]

N.B. : (1) Questions No. **1** is **compulsory**.
  (2) Attempt any **four** out of remaining six questions.
  (3) Assume suitable data if necessary.

1. (a) Explain why the transformers are rated in KVA and not in kW.   5
   (b) What is necessity of starter in dc moter? What is the difference between   5
       three point starter and four point starter
   (c) Explain the principle of electromechanical energy conversion.   5
   (d) Explain significance of back emf.   5

2. (a) Explain sumpner's tests on single phase transformers. What are its   10
       advantages?
   (b) A 250 V dc shunt motor on no load runs at 1000 rpm and takes a current   10
       of 5A. Armature and shunt field resistances are 0.2 Ω and 250 Ω
       respectively. Calculate the speed when loaded and taking current of 50 A if
       armature weakens the field by 3%

3. (a) Define commutation. Explain process of commutation in dc machine.   10
   (b) An autotransformer supplies a load of 5 kW at 125 volt at unity power   10
       factor of the primary voltage is 250 volts, determine -
            (i) Transformation ratio
            (ii) Primary and secondary current
            (iii) Number of secondary turns if total number of turns are 250
            (iv) Percentage saving in copper.

4. (a) Explain Torque-current, Speed- current and speed- torque characteristics   10
       of dc shunt motor.
   (b) A 250 V, 15 kw shunt motor has a maximum efficiency of 88 % and a   10
       speed of 700 rpm when deliversing 80% of its rated output. The resistance
       of its shunt field is 100 Ω. Determine the efficieny and speed when the
       motor draws a current of 78 A from the mains.

5. (a) Starting with ideal transformer develop the exact equivalent circuit of   10
       transformer.
   (b) A field's test on two similar series machines gave following data -   10
       Motor :- Armature Current - 60 A
                Voltage across armature - 500 V
                Voltage across field : 40 V
       Generate :- Terminal voltage : 450 V

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output current : 46 A

voltage across field : 40 V

Armature resistance of each machine is 0.25 Ω Caluculate efficiency of both machines.

6 (a) Explain the need of parallel operation and various conditions for parallel operation of single phase transformer. 10

   (b) Explain construction and working of three point starter. 10

7. Write short notes on any **two** :- 20
    (i) Torque equation for a doubly excited system
    (ii) Saving in copper in autotransformer, its advantages
    (iii) Methods of limiting armature reaction in dc machines.